

## A revision of the Blattodea, Ensifera and Caelifera described by H. Fruhstorfer

Hannes BAUR<sup>1</sup> & Armin CORAY<sup>2</sup>

<sup>1</sup>Department of Invertebrates, Natural History Museum, Bernastrasse 15,  
CH-3005 Bern, Switzerland. E-mail: hannes.baur@nmbe.unibe.ch (correspondence)

<sup>2</sup>Natural History Museum, Augustinergasse 2, CH-4001 Basel, Switzerland.  
E-mail: armin.coray@balcab.ch

**A revision of the Blattodea, Ensifera and Caelifera described by H. Fruhstorfer.** - Twelve taxa described by Fruhstorfer are revised, belonging to Blattodea: Blattellidae (1), Ensifera: Phaneropteridae (1), Tettigoniidae (4) and Caelifera: Acrididae (6). Name-bearing types are deposited in the Swiss Federal Institute of Technology, Zurich (7), the Zoologische Staatssammlung, Munich (1) and the Natural History Museums of Berlin (1) and Geneva (4). Syntype series of two taxa are missing. In seven cases lectotypes are here designated. Four new synonymies are established: Tettigoniidae: *Ephippiger ephippiger eustraius* Fruhstorfer, 1921 = *E. diurnus* Dufour, 1841; *Ephippiger vicheti* Harz, 1966 = *E. persicarius* Fruhstorfer, 1921 **stat. rev.**; *Thamntrizon chabrieri malachiticus* Fruhstorfer, 1921 = *Eupholidoptera chabrieri* (Charpentier, 1825). Acrididae: *Stenobothrus lineatus fervidior* Fruhstorfer, 1921 = *Stenobothrus lineatus* (Panzer, 1796). The paper provides detailed information on name-bearing types, type localities and the current status of each taxon.

**Keywords:** Blattellidae - Phaneropteridae - Tettigoniidae - Acrididae - new synonymy - lectotype designations - taxonomy - distribution.

### INTRODUCTION

Hans Fruhstorfer (1866-1922) was a Swiss naturalist who mainly lived in Germany (Martin, 1922). Coming from a family in modest circumstances he quickly gained some wealth because of his extraordinary talents as a salesman of insects. His financial independence allowed him to travel extensively through South America and Asia where he spent most of his time collecting insects. His main interest was in butterflies and due to innumerable publications and his contributions to the monumental work of Adalbert Seitz on Rhopalocera (butterflies) he became one of the best known lepidopterologists of his days (Martin, 1922). Apparently, he established an incredible number of almost 5000 new names (Seitz, 1922)! Only late in his life, Fruhstorfer developed a keen interest in orthopteroid insects. In a remarkably short time he

assembled a voluminous work in which he mainly investigated the distribution and origin of Swiss grasshoppers, cockroaches, mantids and earwigs (Fruhstorfer, 1920a-1920f, 1921a-1921c). For a very long time his main work "Die Orthopteren der Schweiz und der Nachbarländer..." (Fruhstorfer, 1921c) remained a cornerstone for faunistic research (Thorens & Nadig, 1997), some criticism by Ramme (1923) and Zeuner (1931) notwithstanding. Fruhstorfer (1920d, 1921c) also described a series of new taxa in Blattodea, Ensifera and Caelifera. Although the majority of these new names have merely infrasubspecific status, twelve were formally published in accordance with the *International Code of Zoological Nomenclature* (1999, ICZN) and must be treated as available names (Table 1). In the past, however, many of Fruhstorfer's taxonomic decisions did not receive the attention they deserved, which, in turn, is critical with respect to nomenclatural stability. We therefore present in this revision all

TABLE 1. Synopsis of taxa established by Fruhstorfer

Original names	Valid names
<b>BLATTODEA</b>	
<i>Ectobius neolividus</i> Fruhstorfer	<i>Ectobius vittiventris</i> (A. Costa)
<b>ENSIFERA</b>	
<i>Barbitistes obtusus alpinus</i> Fruhstorfer	<i>Barbitistes obtusus</i> Targioni-Tozzetti
<i>Ephippiger cruciger eustratius</i> Fruhstorfer <b>syn. n.</b>	<i>Ephippiger diurnus</i> Dufour
<i>Ephippiger persicarius</i> Fruhstorfer	<i>Ephippiger persicarius</i> Fruhstorfer <b>stat. rev.*</b>
<i>Ephippiger plinianus</i> Fruhstorfer	<i>Ephippiger bormansi</i> Brunner v. W.
<i>Thamnotrizon chabrieri malachiticus</i> Fruhstorfer <b>syn. n.</b>	<i>Eupholidoptera chabrieri</i> (Charpentier)
<b>CAELIFERA</b>	
<i>Chrysochraon brachypterus chrysoberyllus</i> Fruhstorfer	<i>Euthystira brachyptera</i> (Ocskay)
<i>Omocestus haemorrhoidalis fantinus</i> Fruhstorfer	<i>Omocestus haemorrhoidalis</i> (Charpentier)
<i>Podisma alpina formosanta</i> Fruhstorfer	<i>Miramella (Nadigella) formosanta</i> (Fruhstorfer)
<i>Podisma alpina irena</i> Fruhstorfer	<i>Miramella (Kisella) irena</i> (Fruhstorfer)
<i>Podisma frigida strandi</i> Fruhstorfer	<i>Bohemanella frigida</i> (Boheman)
<i>Stenobothrus lineatus fervidior</i> Fruhstorfer <b>syn. n.</b>	<i>Stenobothrus lineatus</i> (Panzer)

\*= *Ephippiger vicheti* Harz **syn. n.**

pertinent data for a proper taxonomic treatment of Fruhstorfer's names. This includes detailed information on the name-bearing types, the type locality and the current status of the taxa concerned. The present paper is thus intended as a further step towards a *List of Available Names* (ICZN, Art. 79) in orthopteroid insects.

## MATERIAL AND METHODS

Fruhstorfer's insect collection is preserved in several different institutions (Horn *et al.*, 1990) and probably also in some private collections. Horn *et al.* (1990) mention that a collection of Swiss "Orthoptera" had been donated in 1921 to the Swiss

Federal Institute of Technology, Zurich (ETHZ). A large part of the collection is also deposited at the Zoologische Staatssammlung München (Schönitzer, pers. comm.). This is not surprising, since Fruhstorfer moved to Munich shortly before his death (Martin, 1922). We traced further material in the Museums of Basle, Berlin, Geneva and Vienna, but specimens are likely to be encountered in many further collections. Fruhstorfer (1921c; Martin, 1922) was in contact with many colleagues and he certainly also exchanged some specimens. For instance, syntypes of several species were found in the Nadig collection in Geneva.

Fruhstorfer's collection has not been preserved in its original state. The specimens have been removed from their original drawers and have been integrated in general collections of the respective groups. This happened for instance in Zurich, Munich and Vienna. Fruhstorfer's material can nevertheless be recognized because he properly labelled his specimens with printed or partly handwritten labels where he usually noted the locality, date and name of the collector (Figs 1a, 2a, 3b). The only difficulty is that he most often failed to add individual identification labels (see Fig. 2b). From a few remnants it is apparent that he had used single bottom labels (Fig. 1b) to denote a particular taxon in his collection. Such labels are now mostly lost, which renders the identification of particular specimens rather difficult. This is especially true for the type series. Fruhstorfer based his new taxa solely on syntypes which he did not label specially. Therefore, we have accepted as syntypes only those specimens which could be unambiguously recognized by their data label, and which, of course, fit the description well. For instance, we consider as part of the type series of *Chrysochraon brachypterus chrysoberyllus* a specimen labelled "Claro 9.VIII.18" because Fruhstorfer (1921c: 95) cited exactly this locality and date in the original description. We thereby assume that he did not mix his new subspecies with any other grasshoppers mentioned from the same place, e. g. *Omocestus haemorrhoidalis fantinus* or *Gomphocerus rufus*. Such taxa can be easily separated, even by a beginner. However, Fruhstorfer evidently confounded the species of certain genera, for instance of *Ectobius* and *Ephippiger* (Ramme, 1923; Nadig, 1968). Here, we accepted only specimens with unique data labels as type specimens. A female *Ephippiger* labelled "Piandolce 31.X.18" (Figs 3, 6) in the Zoologische Staatssammlung München is thus regarded as part of the type series of *E. plinianus* because Fruhstorfer cited the respective data solely for this *Ephippiger* species.

#### ABBREVIATIONS AND DEPOSITORIES

- ICZN *International Code of Zoological Nomenclature*, Fourth edition (1999)  
 CAN Coll. Adolf Nadig, in MHNG  
 CKH Coll. Kurt Harz, in MHNG  
 ETHZ Eidgenössische Technische Hochschule, Entomologische Sammlung, Zürich, Schweiz  
 MHNG Muséum d'histoire naturelle, Genève, Suisse  
 NHMB Naturhistorisches Museum, Basel, Schweiz  
 NHMW Naturhistorisches Museum, Wien, Österreich  
 NMBE Naturhistorisches Museum, Bern, Schweiz  
 ZMB Zoologisches Museum, Berlin, Deutschland  
 ZSM Zoologische Staatssammlung, München, Deutschland

## INFRASUBSPECIFIC NAMES

Fruhstorfer (1921c) introduced a series of new names using the term "forma" or "forma nova" in combination with a binomen. The content of his descriptions unambiguously reveals that most of these names have merely infrasubspecific rank (ICZN, Art. 45.6.4). Fruhstorfer, apparently, denoted as a new form some outstanding morphs which differed in color or size from the majority of specimens of a variable species. In other words, he named some particular specimens instead of some population(s). We think, it is thus sufficiently clear that such "forms" can have no status in zoological nomenclature, since systematics aims at the delimitation of populations, not individuals (Mayr & Ashlock, 1991; Cracraft, 1997). For completeness, we list the respective names and summarize the content of their descriptions. We would like to stress that these names had never been adopted as the valid names of a taxon. They are not available and cannot enter the synonymy. The following nineteen names belong here: *Barbitistes obtusus* f. "picta" (p. 176, color variety); *Barbitistes obtusus* f. "viridescens" (p. 176, color variety); *Chorthippus dorsatus* f. "nigripennis" (p. 130, color variety); *Chorthippus dorsatus* f. "pallilis" (p. 130, color variety); *Conocephalus tuberculatus* f. "persicaria" (p. 191, color variety); *Gomphocerus rufus* f. "alpicola" (p. 99, size and color variety); *Gomphocerus rufus* f. "insubrica" (p. 99, color variety); *Gomphocerus rufus* f. "murina" (p. 99, color variety); *Gomphocerus rufus* f. "pygmaea" (p. 99, size variety); *Gomphocerus sibiricus* f. "deminutus" (p. 103, size variety); *Gomphocerus sibiricus* f. "viridopicta" (p. 103, color variety); *Mecostethus grossus* f. "vinula" (p. 143, color variety); *Platycleis brachyptera* f. "deminuta" (p. 221, 222, size variety); *Platycleis brachyptera* f. "restricta" (p. 220, 222, size and color variety); *Platycleis brachyptera* f. "rhaetorum" (p. 220, 222, color variety); *Platycleis saussureana* [sic] f. "rugosa" (p. 223, 224, size and color variety); *Stauroderus miniatus* f. "smaragdina" (p. 116, female color variety); *Stenobothrus lineatus* f. "interposita" (p. 108, color variety); *Stenobothrus lineatus* f. "myrina" (p. 108, color variety).

The names of the four *Platycleis*-formae are in fact borderline cases. From their first mentioning and the descriptions, these names might be regarded as subspecific. On the other hand, Fruhstorfer evidently listed them in addition to a trinomen in his classification of taxa (see pp. 222, 224). In our opinion, this is a clear indication that he really intended to give them infrasubspecific rank. As we noted above, these names have never been used as the valid names of a taxon, Otte's (1997: 289) adoption of "deminuta" in the rank of a species notwithstanding. A merely formal elevation in rank, however, does not make it an available name (compare ICZN, Arts. 11.5.2 and 45.5.1). The same applies in the case of Yin *et al.* (1996) who listed "*Stauroderus miniatus smaragdina* [sic] Fruhstorfer" as a valid name in their catalogue of World grasshoppers.

A further two names, *Podisma alpina formosanta* and *P. a. irena*, have also been introduced as "forma nova" by Fruhstorfer (1921c) but are considered as available names (see under their respective headings).

## CATALOGUE OF TAXA ESTABLISHED BY FRUHSTORFER

For easy access the taxa are arranged alphabetically within families, i.e. first the original genus then the species. After name, author, year, and page number where the species was first described, the name-bearing type (bold if designated here) and type locality are noted. Where possible the current spelling of a locality is given. *Material* starts with name-bearing types. Labels are cited in quotation marks, the text is rendered exactly as spelt, with semicolons separating the different labels. Mostly original labels are quoted only, beginning with the uppermost. Square brackets indicate additional information (such as a red label, print or handwriting, etc.). Remaining specimens of a type series are listed more summarily, their labels are cited only if necessary. Voucher specimens are detailed for difficult taxa in the Appendix, otherwise that material is summarized by reference to the respective depositories. *Discussion* provides further information on the type material and mentions additional specimens which are doubtfully attributed to the type series or otherwise noteworthy. Taxonomic notes are usually included. Terminology and abbreviations of morphological terms follow Harz (1969, 1975). We apply the Phylogenetic Species Concept which makes no use of the subspecies category. Following this concept, populations are classified as species when they are diagnosably distinct from other populations by a unique combination of fixed character states (Cracraft, 1989; Nixon & Wheeler, 1990). *Status* finally lists current usage of a name.

## BLATTODEA

## BLATTELLIDAE

*Ectobius neolividus* Fruhstorfer

*Ectobius neolividus* Ramme & Fruhstorfer [*sic*], 1921c: 78, 79. Syntypes ♂ ♂ ♀ ♀, Switzerland: Canton Ticino, Denti della Vecchia and Canton Grisons, Plotta near Soglio (CAN, ZMB [examined]).

*Material.* Syntypes, CAN: 1 ♀ (directly pinned, right hind tarsus lacking) labelled "Soglio Anf. 8. [*sic*] 20 Fruhstorfer [print]; Ectob. ♀ neolividus Fruhst. [Fruhstorfer's hand, blue ink, label with border]; Ectobius vittiventris (COSTA) K. HARZ det. [print, blue ink]" (see Fig. 2) and 1 ♂ (directly pinned, left antenna, left hind leg and left hind tarsus lacking) labelled "Soglio Anf. 8. [*sic*] 20 Fruhstorfer [print]; Ectobius ♂ vittiventris Costa [hand] Ramme det. [print]; Ectobius vittiventris (COSTA) K. HARZ det. [print, blue ink]". ZMB: 1 ♀ (directly pinned, with ootheca; left antenna, right antenna partly, left fore and right mid leg beyond coxae and hind tarsi lacking) labelled "Dti Vecchia 5.IX.19 Fruhstorfer [print]".

*Discussion.* Fruhstorfer (1921c: 78) mentioned further material from the southern part of the Canton Ticino but did not specify the number of specimens he had. He (1921c: 79) also examined specimens in the MHNG from "Hyères", "Sizilien" and "Curzole in Dalmatien" which could not be traced. The above specimens match the data given for only one species of *Ectobius*, *E. neolividus*, and are thus considered as syntypes. The collecting date on the labels of the two specimens from Soglio is indicated as beginning (= "Anf.") of August whereas it was quoted as end of July by Fruhstorfer (1921c: 78). Because both dates essentially refer to the same time period, this minor discrepancy does not, in our opinion, disqualify the specimens as syntypes.

*E. neolividus* has been introduced with “Ramme & Fruhstorfer” as authors. But from the contents the contribution of Ramme is not evident. It is also noteworthy in this context, that Ramme heavily criticized Fruhstorfer who, apparently, had misunderstood “Meine ausdrücklich als unverbindlich gekennzeichneten Mitteilungen...” on *Ectobius* (Ramme, 1923: 107). Hence, we consider Fruhstorfer as the only person responsible for both the name and the criteria of availability (ICZN, Art. 50.1), as was done by subsequent authors (Princis, 1971; Harz & Kaltenbach, 1976; among others).

*E. neolividus* is currently considered to belong to *E. vittiventris* (see Ramme, 1923; Harz & Kaltenbach, 1976; Baur *et al.* 2004). This species is rather variable and might consist of a complex of sibling species (Bohn, pers. comm.). Therefore, we have refrained from the designation of a lectotype for *E. neolividus*.

*Status.* Junior synonym of *Ectobius vittiventris* (A. Costa, 1847) (Ramme, 1923: 130).

## ENSIFERA

### PHANEROPTERIDAE

#### *Barbitistes obtusus alpinus* Fruhstorfer

*Barbitistes obtusus alpina* [sic] Fruhstorfer, 1920d: 77, 82, 85. **Lectotype** ♂, Switzerland, Canton Ticino: Monte Generoso, Crocetta, here designated (CAN [examined]).

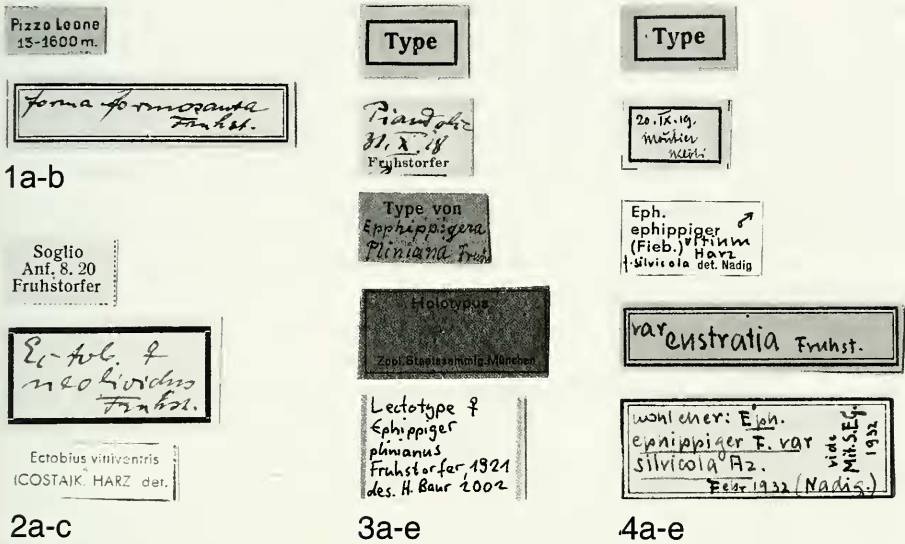
*Material.* Lectotype (directly pinned, right antenna partly and left hind tibia partly lacking) labelled “Generoso-Crocetta 29.VII.19 Fruhstorfer [print]”.

Paralectotypes, ZSM: 1 ♂ (directly pinned) labelled “Generoso-Crocetta 8.VIII.19 Fruhstorfer [print]”; *Barbitistes obtusus* Targ.-Toz. det. D. R. Ragge, 1959 [print]”. ZSM: 1 ♀ (directly pinned) labelled “Generoso-Crocetta 1.IX.19 Fruhstorfer [print]”, “*Barbitistes obtusus* [sic] Targ. Toz. ♀ [hand] det. K. Harz [print]”.

*Discussion.* Fruhstorfer introduced *Barbitistes obtusus alpinus* in the “Tessiner Wanderbilder” (1920d: 77) where he provided a brief definition of the taxon using the following statement: “Der *Barbitistes* aber stellte sich beim Vergleich mit einem Anfang Juli bei Chiasso gefundenen Exemplar als eine interessante, verkleinerte und verdunkelte alpine Rasse von *obtusus* heraus, jetzt **alpina** Fruhst.”. The connotation as a race (“Rasse”) formally makes it a subspecific name. A more detailed diagnosis of *B. o. alpinus* (note that *Barbitistes* is masculine, hence *B. o. alpinus*) was given later by Fruhstorfer (1921c: 179). He (1920d: 77, 82, 85) collected 2 ♂, 1 ♀ on three occasions during July to September 1919 near the south-western slope of Crocetta. The place is situated at about 1360 m altitude in the northern part of the Monte Generoso massif. The labels fit exactly the data given by Fruhstorfer (1920d, 1921c) for only one taxon of *Barbitistes*, *B. o. alpinus*. The lectotype is the smallest specimen of the type series and is thus closest to Fruhstorfer’s definition (1920d: 77). He also explicitly referred to the respective male on the same page. In order to ensure stability in the application of this name, we have chosen this specimen as the lectotype (ICZN, Art. 74.7.3).

Examination of the type series and much additional material (CAN, ETHZ, MHNG, NHMB, NMBE, ZSM) confirms the view of Nadig *et al.* (1991) that *B. o. alpinus* cannot be separated from *B. obtusus* which is widely distributed in the Canton Ticino (Thorens & Nadig, 1997).

*Status.* Junior synonym of *Barbitistes obtusus* Targioni-Tozzetti, 1881 (Nadig *et al.*, 1991: 238).



FIGS 1-4

Labels on specimens, original size (our labels were omitted, except for figure 3e): (1) Paralectotype ♀ of *Podisma alpina formosanta* Fruhstorfer; Fig. 1b is a bottom label in Fruhstorfer's handwriting. (2) Syntype of *Ectobius neolividus* Fruhstorfer; Fig. 2b is an original identification label by Fruhstorfer. (3) Lectotype of *Ehippiger plinianus* Fruhstorfer; Fig. 3b is a data label in Fruhstorfer's handwriting. (4) Lectotype of *Ehippiger cruciger eustratius* Fruhstorfer; Fig. 4d shows a different handwriting and is probably not an original bottom label.

## TETTIGONIIDAE

*Ehippiger cruciger eustratius* Fruhstorfer

*Ehippiger cruciger eustratia* Fruhstorfer, 1921c: 231. **Lectotype** ♂, Switzerland, Canton Bern: Moutier, Klus, here designated (ETHZ [examined]).

**Material.** Lectotype ♂ (directly pinned, left antenna partly, left hind tarsus partly and right hind leg beyond coxa lacking, titillators damaged at base by pest insects) labelled "Type [print, yellow label with border]; 20.IX.19. Moutier Klöti [hand, label with border]; Eph. ehippiger [print] ♂ [hand] Fieb. [print] vitium Harz f. silvicola [hand] det. Nadig [print]". Two further labels were placed near the specimen. One label reads "var eustratia Fruhst. [hand, grey label with double border]", the other one shows a note by Nadig "wohl eher: Eph. ehippiger F. var silvicola Az. Febr 1932 (Nadig.) vide Mit. S. E. G. 1932 [hand, label with double border]" (Fig. 4).

Paralectotype, ETHZ: 1 ♂ (directly pinned) with similar data to lectotype, considered as part of the type series.

**Discussion.** Fruhstorfer (1921c: 231) mentioned material from "Solothurner Jura, Moutier" but did not specify the number of specimens he had. However, his short description was actually based on material which was collected in 1919 by E. Klöti-Hauser "an der Strasse die von Moutier durch die Birsschlucht nach Choindez führt" (Klöti-Hauser, 1922, see also Nadig, 1932). Of the seven males collected by Klöti-Hauser, only two survived in the ETHZ collection. The lectotype fits the original description and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and might include

more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers. The names of this and the following *Ephippiger* taxa first appeared in combination with *Ephippigera* Serville, 1831, an unjustified emendation of *Ephippiger* Berthold, 1827. These names have to be treated as though they were published in combination with *Ephippiger* (ICZN, Art. 51.3.1).

Re-examination of the type series and additional material (Appendix) fully confirms the synonymy of *E. c. eustratius* with *E. diurnus* Dufour (see Nadig, 1932, sub *E. vitium*).

*Status.* Junior synonym of *Ephippiger diurnus* Dufour, 1841 [= *E. vitium* of authors, not Serville, 1831]<sup>1</sup> **syn. n.**

### *Ephippiger persicarius* Fruhstorfer

Fig. 5

*Ephippigera persicaria* Fruhstorfer, 1921c: 230, 33. Syntypes ♂♂ ♀♀, Switzerland, Canton Ticino: Monte Carasso, above Monti di Freghisio and Alpe di Orina over Cugnasco (?depository [not located]).

*Discussion.* Fruhstorfer (1921c: 230, 33) mentioned one female from Monte Carasso but did not specify the number of specimens he had from Alpe di Orina. The two localities are separated only by a distance of about three kilometres and are situated on the southern slopes of elevations north of the Piano di Magadino and the Ticino river. Monte Carasso is the name of a village at the bottom of the Ticino valley at about 230 m altitude. But according to Fruhstorfer (1921c: 33, 230), the specimen was found above Monte Carasso and near Monti di Freghisio at about 1600-1700 m altitude. There is only one place at this altitude which is devoid of forest and therefore suitable as a habitat of *Ephippiger*, that is the south-western slope of the Cima della Pianca (Swiss grid co-ordinates 717.9/119.3, 1600-1700 m, see Appendix).

Of the two *Ephippiger* species described by Fruhstorfer from the Canton Ticino, a few female syntypes of *E. plinianus* are kept at the ZSM (see below) but no specimen of *E. persicarius* could be traced so far. This is in contrast to Nadig's claim (1960: 28, footnote) that "Die Type von *E. pliniana* [*sic*] ist unauffindbar (Nadig, 1931), jene von *E. persicaria* [*sic*], ein ♀ steckt ... in der Zoolog. Sammlung des bayerischen Staates in München [= ZSM]". We thus assume that Nadig simply confounded the species names in his footnote.

The information given by Fruhstorfer (1921c) concerning his *Ephippiger* material from the Canton Ticino is rather confusing and sometimes contradictory (see Zeuner, 1931 for a critical discussion). His descriptions of the new species, *E. persicarius* and *E. plinianus*, are short and insufficient for their unambiguous recognition, original material is scarce. These shortcomings led to serious difficulties concerning

<sup>1</sup> Audinet-Serville (1831) introduced *E. vitium* as a replacement name for *Locusta ephippiger* Fabricius (= *Gryllus ephippiger* Fiebiger, see Coray & Lehmann, 1998: 88), which is why the name has to be considered as a junior objective synonym of *E. ephippiger* (Fiebiger) (ICZN, Art. 72.7). Hence, the name *vitium* Serville cannot be retained to denote the Western European populations of the *E. ephippiger* species-aggregate, despite claims to the contrary in some recent works (Coray & Lehmann, 1998; Coray & Thorens, 2001). For the taxon in question, *E. diurnus* Dufour has been adopted (Kruseman, 1988; Oudman *et al.*, 1990; Ingrisch & Köhler, 1998; all sub *E. ephippiger diurnus*).



the identity of the taxa involved and resulted, as we will show below, in the unjustified neglect of *E. persicarius* by Harz (1966) and subsequent authors.

In an attempt to clarify the identity of *E. persicarius*, it is important to consider the distribution of the *Ephippiger* species in the Canton Ticino. More recent investigation have shown that only two species occur there, *E. vicheti* Harz and *E. bormansi* Brunner von Wattenwyl, of which detailed data on their horizontal and vertical distribution are available (Nadig, 1968; Thorens & Nadig, 1997; Baur, Rösti, pers. observation). A careful evaluation of these data in combination with a re-examination of the remaining material of the Fruhstorfer collection gave us new insights with regard to the identity of the taxa. Thus, it is evident from the type material deposited in the ZSM that *E. plinianus* belongs to *E. bormansi* (see below). Furthermore, we agree with Nadig (1968: 343) that specimens in the ETHZ and the NHMW identified by Fruhstorfer as *E. perforatus* (Rossi) (see Appendix) belong to *E. vicheti* and not to a third species. The identity of *E. persicarius*, finally, is less obvious because of a lack of syntypes and the poor original description. Fruhstorfer (1921c: 230) emphasised the violet or peachy coloration of his specimens which he collected late in the year. We observed that topotypical specimens are indeed darker in October (Fig. 5) than in the months before (Baur, Rösti, pers. observation). As pointed out by Zeuner (1931: 33, 34, sub *E. vitium*) the other characters given by Fruhstorfer lie within the range of variation of *E. vicheti*. Moreover, it is most revealing that only one species, *E. vicheti*, is present in the region where the two type localities of *E. persicarius* are situated. This is evident from the detailed studies by Nadig (1968) and Thorens & Nadig (1997) and from recent collections made by the senior author at the type localities. Following these investigations *E. bormansi* is known to occur only south of the Ticino river, where it is found on sunny slopes in grass and small shrubs from about 900 up to 1900 m altitude. *E. vicheti* is mostly a vicariate of *E. bormansi* that lives from the bottom of the valleys up to about 1100 (-1450) m altitude in fern (*Pteridium*), bushes and lower trees. But in places such as the elevations north of the Ticino river, where *E. bormansi* is absent, *E. vicheti* is also encountered at higher altitudes up to 1650 m (Nadig, 1968; Baur, Rösti, pers. observation). In conclusion, these findings leave no doubt that *E. persicarius* has to be regarded as a senior synonym of *Ephippiger vicheti* Harz, 1966 **syn. n.** (see also Nadig, 1968: 343, footnote). The identity of populations from the respective type localities has been demonstrated by several authors (Harz, 1966; Nadig, 1987) and is confirmed by examination of the holotype of *E. vicheti* (from Italy, Trentino, Storo) and much additional material from the respective regions (Appendix).

*E. persicarius* evidently forms a diagnosably distinct taxon of the allopatric *E. ephippiger* species-aggregate (compare the distribution map in Detzel, 1998: 283). It occurs on the southern side of the Alps from the Piedmont (Italy) in the west (Nadig, 1987) to Styria (Austria) in the east and Istria (Croatia) in the south-east (Harz, 1966). It is separated from the Western European *E. diurnus* Dufour (type locality St.-Sever in France, Dept. Les Landes) by song characteristics (Duijm, 1990), the absence of a pronounced color polymorphism in adults (Hartley & Bugren, 1986), less strongly pointed male cerci, shorter titillators and the lack of paired sclerotized plates on the female subgenital plate (compare Duijm & Oudman, 1983, figures 1-2,4; sub *E. ephippiger vicheti*). The latter character state is shared with the eastern European *E.*

*ephippiger* (Fiebig) (type locality Vienna in Austria) but this species has much longer titillators (see Nadig, 1987: 332, figure 16) and the apical part of the male cerci strongly pointed as in *E. diurnus*. Alleged character transitions in the Eastern refuge of *E. persicarius* (Harz, 1966, sub *E. e. vicheti*) might be the result of secondary hybrid zones which are irrelevant with regard to the classification of taxa as phylogenetic species (Cracraft, 1989).

Our findings are in contrast to those of Hartley & Warne (1984) who synonymised *E. persicarius* (sub *E. e. vicheti*) with *E. ephippiger*. Their view probably led to the disregard of *E. persicarius* in a few subsequent works (Heller, 1988; Heller *et al.*, 1998; Ragge & Reynolds, 1998), although in the most recent studies *E. persicarius* (sub *E. vicheti*) has been considered as a distinct taxon (Nadig, 1987; Otte, 1997; Thorens & Nadig, 1997; Ingrisch & Köhler, 1998; Coray & Thorens, 2001; Fontana *et al.*, 2002; among others). We would like to stress that the proposed synonymy of Hartley & Warne is actually based on too little evidence (see also Nadig, 1987). Apparently, they (1984: 46) examined just "a few specimens" of *E. persicarius* from Lago Maggiore (Northern Italy) and another two specimens from Skopje (Macedonia) which they regarded as *E. ephippiger* but no topotypical material at all.

*Status.* *Ephippiger persicarius* Fruhstorfer, 1921c **stat. rev.**

### *Ephippiger plinianus* Fruhstorfer

Fig. 6

*Ephippigera pliniana* Fruhstorfer, 1921c: 233. **Lectotype** ♀, Switzerland, Canton Ticino: Val Morobbia, Monti Piandolce, here designated (ZSM [examined]).

*Material.* Lectotype ♀ (directly pinned, left antenna partly, right fore tarsus partly and right mid tarsus lacking) labelled "Type [print, yellow label with border]; Piandolce 31.X.18 [hand] Fruhstorfer [print]; Type von [print] Epphippigera [sic] Pliniana Fruh [hand, orange label]; Fruhstorfer Orth. d. Schwz [sic] (1921c) p. 233. [back side of former label]; Holotypus Zool. Staatsammlg. München [print, red with black border]" (Figs 3, 6).

Paralectotypes, ZSM: 2 ♀ (directly pinned) labelled "Mti Croce 29.X.18 [hand, blue ink] Fruhstorfer [print]; ..." from Monti della Croce at Motto d'Arbino over Bellinzona (Fruhstorfer, 1921c: 234).

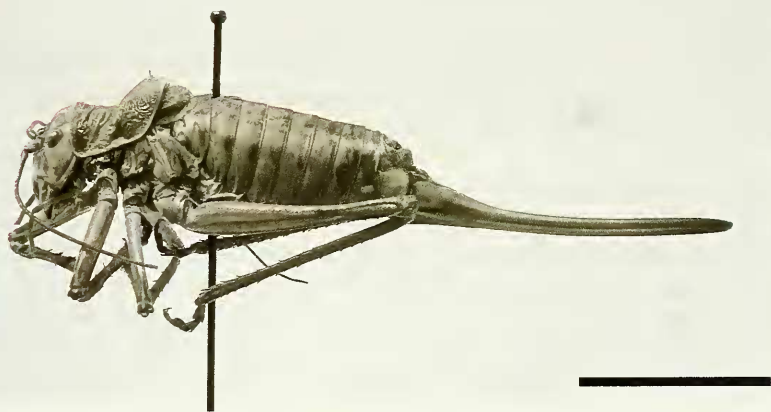
*Discussion.* It is likely that only the second label on the lectotype is from Fruhstorfer himself. The label "Holotypus ..." has certainly been added later. However, the information content of the data label matches exactly the data given by Fruhstorfer (1921c: 234) for only one species of *Ephippiger*, *E. plinianus*. He mentioned also specimens from Monte il Gaggio and Monte Boglia but did not specify the number of specimens he had. The lectotype fits the original description and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and might include more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers.

Re-examination of the lectotype and much additional material (Appendix) fully confirms the view of authors (Nadig, 1960, 1980; Harz, 1969) that *E. plinianus* is the same as *E. bormansi* which is widely distributed in southern parts of the Canton Ticino (Thorens & Nadig, 1997).

It is unclear whether *E. bormansi* is really diagnosably distinct from *E. terrestris* (Yersin). We have not examined enough material of the latter to decide this question, which is why we rely on the detailed investigations by Nadig (1980) and



5



6

FIGS 5-6

(5) A female of *Ehippiger persicarius* Fruhstorfer from Monti della Gana in Canton Ticino, a place very close to one of the two type localities, Alpe di Orino. The spread of violet to peachy tinges on pronotum and abdomen increases with age and characterizes many older specimens in autumn. According to the original description, the missing syntypes may have had a similar appearance. Photograph D. Röstli. (6) Lectotype female of *Ehippiger plinianus* Fruhstorfer, a junior synonym of *E. bormansi* Brunner von Wattenwyl. This species also occurs in the Canton Ticino but is absent from the region where the type localities of *E. persicarius* are situated. Scale 1 cm. Photograph L. Schäublin.

Landman *et al.* (1989). According to these studies the two species are well separated over most of their ranges but form a broad hybrid zone in the south-western part of the Alps. Clinal variation has been observed in several important features within each taxon. On the other hand, Nadig (1980) asserted that the hybrid zones are likely to be the result of secondary contact. Clearly further work is necessary to solve these problems. For the time being, we keep *E. bormansi* as a separate taxon, as was done in some recent works (Nadig, 1987; Otte, 1997; Thorens & Nadig, 1997; Ingrisch & Köhler, 1998; Coray & Thorens, 2001).

*Status.* Junior synonym of *Ephippiger bormansi* Brunner von Wattenwyl, 1882 (Harz, 1969: 514).

### *Thamnotrizon chabrieri malachiticus* Fruhstorfer

*Thamnotrizon chabrieri malachiticus* Fruhstorfer, 1921c: 209, 210. Syntypes ♀♀, Switzerland, Canton Ticino: Ligornetto-Tremona and Ligornetto-Meride (CAN, ETHZ [examined]).

*Material.* Syntypes, CAN: 1 ♀ (directly pinned, right antenna partly lacking) labelled "Ligornetto-Meride 17.IX.19 Fruhstorfer [print]; *chabrieri* Ch. [print, not original]". ETHZ: 1 ♀ (directly pinned, left antenna partly and left hind tibia partly lacking; left hind leg pinned below specimen) labelled "Ligornetto-Tremona Aug. 19 Fruhstorfer [print]".

*Discussion.* Fruhstorfer first introduced the name *malachiticus* in the "Tessiner Wanderbilder" (1920d: 30, 35, 38, 81) but it was not thereby made available. This happened only later (Fruhstorfer, 1921c: 210) when a definition of the taxon was provided. Fruhstorfer mentioned several males and females from Ligornetto, Mendrisio and Meride in the southern parts of the Canton Ticino but did not specify the total number of specimens he had. However, only the above two female syntypes could be traced. They fit the original description and are obviously conspecific. Because the delimitation of species in this genus is almost entirely based on the male genitalia, we prefer to refrain from the designation of a lectotype.

According to Nadig (1985a: 176) *Eupholidoptera chabrieri* (Charpentier) occurs in the Insubrian region, i. e. the region south of the Alps between the Lago Maggiore and the Lago di Como (including the southern parts of the Canton Ticino). However, Nadig also stressed that the Insubrian specimens differed slightly from topotypical material in the shape of titillators which is why he erected an infrasubspecific name for the Insubrian populations. In case future investigations should substantiate the existence of a separate taxon, the name *T. c. malachiticus* is available.

*Status.* Junior synonym of *Eupholidoptera chabrieri* (Charpentier, 1825) **syn. n.**

## CAELIFERA

### ACRIDIDAE

### *Chrysochraon brachypterus chrysoberyllus* Fruhstorfer

*Chrysochraon brachypterus chrysoberyllus* Fruhstorfer, 1921c: 95, 96. **Lectotype** ♀, Switzerland, Canton Ticino: Pizzo Claro, here designated (ETHZ [examined]).

*Material.* Lectotype ♀ (directly pinned, entire) labelled "Claro 9.VIII.18 [hand, blue ink] Fruhstorfer [print]".

Paralectotypes, ETHZ: 19 ♂, 26 ♀ (directly pinned) from "Piandolce", "Generoso", "Generoso-Crocetta", "Ligornetto-Meride", "Dti Vecchia", "Pizzo Leone", "Mt. Boglia", "Mt. Croce" and "Mt. Carasso".

*Discussion.* Fruhstorfer (1921c: 95) mentioned material from many localities in the Canton Ticino but did not specify the number of specimens he had. The lectotype fits the original description very nicely and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and might include more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers.

Fruhstorfer (1921c: 96) considered *chrysoberyllus* as a "Südrasse" which he separated from specimens north of the Alps solely by the emerald coloration of the female fore wing. However, our analysis of an extensive material (CAN, ETHZ, MHNG, NHMB, NMBE, ZSM) revealed that it is actually impossible to separate *chrysoberyllus* from *E. brachyptera* (Ocskay) which is widely distributed in Switzerland (Thorens & Nadig, 1997).

*Status.* Junior synonym of *Euthystira brachyptera* (Ocskay, 1826) (Yin *et al.*, 1996: 286).

### *Omocestus haemorrhoidalis fantinus* Fruhstorfer

*Omocestus haemorrhoidalis fantinus* Fruhstorfer, 1921c: 110. **Lectotype** ♂, Switzerland, Canton Ticino: Pizzo Claro, here designated (ETHZ [examined]).

*Material.* Lectotype ♂ (directly pinned, right antenna lacking) labelled "Claro. 9.VIII.18 [hand] Fruhstorfer [print]".

Paralectotypes, ETHZ: 5 ♀ (directly pinned) from "Mte Bar", "Tamaro", "Faido" and "Piandolce".

*Discussion.* Fruhstorfer (1921c: 110) mentioned material from many localities in the Canton Ticino but did not specify the number of specimens he had. The lectotype fits the original description and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and might include more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers.

*O. h. fantinus* is obviously the same as *O. haemorrhoidalis* (Charpentier) which is widespread in southern Switzerland (Thorens & Nadig, 1997). Examination of many specimens (CAN, ETHZ, MHNG, NHMB, NMBE, ZSM) showed that the differences in size and coloration mentioned by Fruhstorfer (1921c: 110) are rather variable and do not allow the separation of his taxon.

*Status.* Junior synonym of *Omocestus haemorrhoidalis* (Charpentier, 1825) (Yin *et al.*, 1996: 462).

### *Podisma alpina formosanta* Fruhstorfer

*Podisma alpina* forma *formosanta* Fruhstorfer, 1921c: 164f., 167. Lectotype ♂, Switzerland, Canton Ticino: Monte Generoso, Camoscé, designated by Nadig (1989: 206) (ETHZ [examined]).

*Material.* Lectotype ♂ (directly pinned, entire) labelled "Generoso-Camoscé, 22.IX.19 Fruhstorfer [print]; M. formosanta FRUHST. det. A. Galvagni 19 [print]; M. for. formosanta (FRUHST.) [print] ♂ [hand] det. NADIG [print]; LECTO-Holo-Typus [print, red label with black border]"

Paralectotypes, CAN: 4 ♂, 5 ♀ (directly pinned) from "Bedretto [one male with identification label by Fruhstorfer]", "Pizzo Leone [one female with original bottom label of the Fruhstorfer coll. (Fig. 1b)]", "Buffalora", "Tamaro". ETHZ: 10 ♂, 25 ♀ (directly pinned) from

“Generoso-Camoscé”, “Generoso-Crocetta”, “Val Osogna”, “Bedretto”, “Passo Predelp”, “Generoso”, “Tamaro”, “Pizzo Leone”, “Buffalora” and “Monte Boglia”. CKH: 1 ♂, 1 ♀ (directly pinned) from “Bedretto”.

*Discussion.* Fruhstorfer first mentioned “*Podisma alpina* forma *formosanta*” in the “Walliser Wanderbilder” (1920a: 44) but the name was not thereby made available. This happened only later (1921c: 164) when a description of the taxon was provided. Fruhstorfer (1921c: 167) mentioned material from several localities in the Canton Ticino but did not specify the number of specimens he had. Although the name has been introduced as a “forma” it must be considered subspecific (ICZN, Art. 45.6.4.1).

Mistshenko (1952: 397) first applied the name *formosanta* to a subspecies of *Miramella alpina* (Kollar). Nadig (1986) finally adopted it for a species of which he (1989) later gave a thorough analysis of the morphology and distribution.

*Status.* *Miramella (Nadigella) formosanta* (Fruhstorfer, 1921c) (Nadig, 1989: 206).

### *Podisma alpina irena* Fruhstorfer

*Podisma alpina* forma *irena* Fruhstorfer, 1921c: 251. Syntypes ♂♂♀♀, Italy, South Tyrol: Penegal and St. Vigil (?Depository [not located]).

*Discussion.* Fruhstorfer (1921c: 251) mentioned material collected by himself from Penegal and by W. Ramme from St. Vigil but did not specify the number of specimens he had. From St. Vigil 5 ♂, 5 ♀ are present in the ZMB and a further 1 ♂, 1 ♀ in the ZSM. Unfortunately, the specimens lack any original labels by Fruhstorfer, which is why the material cannot be recognized as part of the type series with certainty. Harz (1975) and Nadig (1989) considered the type series to be lost. Furthermore, the neotype designation of Harz (1975: 290) is invalid because it fails to meet the qualifying conditions of the *Code* (ICZN, Art. 75.3). Instead of a single specimen Harz selected a pair of neotypes which had not become the property of a scientific institution immediately upon publication but remained in his private collection. However, we think that the lack of type material is not problematic here. Fruhstorfer indicated the origin of his specimens very precisely which made it possible for Galvagni (1986) and Nadig (1989) to study topotypical material. Following their investigations, only one species of *Miramella* is known from these localities. Hence, we cannot see any exceptional circumstances (ICZN, Art. 75) that would justify the designation of a neotype.

The taxonomic history of *P. a. irena* is nevertheless complicated and requires further discussion. Galvagni (1954) was the first to apply the name for a subspecies of *Miramella* Dovnar-Zapolskij, *M. carinthiaca irena*. With this action he made this name definitely available (ICZN, Art. 45.6.4.1). Galvagni’s classification was followed by Harz (1973, 1975) who included *M. c. irena* in his new subgenus *Kisella* Harz, 1973. Nadig (1985b), following the opinion of Galvagni (in litt.), established the currently accepted status as a separate species, *M. irena*. Galvagni (1986) refined the concept of the species and also found that he had partly misidentified *M. irena* as *M. carinthiaca* in his earlier paper (Galvagni, 1954). Finally, Nadig’s (1989) monograph on Central European *Miramella* is most useful, because he meticulously sorted out the morphological and distributional limits of *M. irena* and related taxa such as *M. carinthiaca*. However, the fact that the two species had been confounded earlier by Galvagni (1954)

apparently led to the misidentification of the type species of *Kisella*, *Podisma alpina carinthiaca*, by Harz (1973). Moreover, this taxon had notoriously been attributed to a wrong author and date (Puschnig, 1910 instead of Obenberger, 1926!) since its establishment. Hence, we address these problems, which are critical concerning the identity of the taxa involved, in a separate paper (Baur & Coray, 2004, this volume).

*Status.* *Miramella (Kisella) irena* (Fruhstorfer, 1921c) (Nadig, 1989: 186).

### *Podisma frigida strandi* Fruhstorfer

*Podisma frigida strandi* Fruhstorfer, 1921c: 159. **Lectotype** ♂, Switzerland, Canton Graubünden: Muottas-Muragl, here designated (ETHZ [examined]).

*Material.* Lectotype ♂ (directly pinned, entire) labelled “Muottas-Muragl [sic] 2200–2400 m 10.8.20 Fruhstorfer [print]”.

Paralectotypes, CAN: 1 ♂ (directly pinned) from “Muottas Muragl [sic]”. ETHZ: 2 ♂, 7 ♀ (directly pinned) from “Muottas Muragl [sic]”, “Sparrhorn”, “Bedretto” and “Belalp”.

*Discussion.* Fruhstorfer (1921c: 159) mentioned material from the Alpine belt throughout Switzerland but did not specify the number of specimens he had. The above mentioned specimens fit exactly the data given by Fruhstorfer and are thus considered as part of the type series. The lectotype fits the original description and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and might include more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers.

The name *Bohemanella frigida strandi* had been used to denote the Alpine populations of *B. frigida* (Boheman) (e.g. Harz, 1975, sub *Melanoplus*) but is now treated as a synonym of the latter (Nadig *et al.* 1991; Ingrisch & Köhler, 1998 and others). In case further studies would confirm a separate status of these Alpine populations, the name *Podisma prossenii* Puschnig, 1910 should also be considered (see Ebner, 1937: 149).

*Status.* Junior synonym of *Bohemanella frigida* (Boheman, 1846) (Nadig *et al.*, 1991: 281).

### *Stenobothrus lineatus fervidior* Fruhstorfer

*Stenobothrus lineatus fervidior* Fruhstorfer, 1921c: 109, 108. **Lectotype** ♂, Switzerland, Canton Ticino: Monte Bisbino, here designated (ETHZ [examined]).

*Material.* Lectotype ♂ (directly pinned, left mid tarsus lacking) labelled “Mte Bisbino 21.VIII.19 Fruhstorfer [print]”.

Paralectotypes, ETHZ: 16 ♂, 1 ♀ (directly pinned) from “Generoso-Crocetta”, “Ligor-netto”, “Mt. Boglià” and “Mte Bar”. ZSM: 2 ♂ (directly pinned) from “Mte Boglià”.

*Discussion.* Fruhstorfer (1921c: 108, 109) mentioned material from several localities in the Canton Ticino and Valais but did not specify the number of specimens he had. The name was introduced on p. 108 as “forma *fervidior* Fruhst.” but on the following page Fruhstorfer denoted “*fervidior* subsp. nova” as a distinct Southern race which also comprised the forma *obscura* Zacher. For this reason *fervidior* has to be treated as a subspecific name. The lectotype fits well the characters given by Fruhstorfer (1921c: 109) and is designated to ensure stability in the application of this name (ICZN, Art. 74.7.3). The composition of the entire type series is uncertain and

might include more than one taxon. The lectotype designation makes it clear to which taxon this name actually refers.

Fruhstorfer (1921c: 109) mainly stressed the intense, reddish coloration on hind legs and apex of abdomen of *S. l. fervidior*. Examination of an extensive material (CAN, ETHZ, MHNG, NHMB, NMBE, ZSM) revealed that this character is actually highly variable and does not allow the separation of the taxon from the widespread *S. lineatus* (Panzer) (Thorens & Nadig, 1997).

*Status.* Junior synonym of *Stenobothrus lineatus* (Panzer, 1796) **syn. n.**

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## APPENDIX

Material of *Ephippiger* examined in this study. The data of many specimens have already been published by Nadig (1968, 1987) or Thorens & Nadig (1997) and are thus quoted in short form.

*E. bormansi*, CAN: ITALY, Como: Val Sanagra, A. Livea 1 ♀; Val Sanagra, S A. Erba 1 ♂; Monte Grona 2 ♂; CH, Canton Ticino, Monte Boglia 1 ♂; Lago di Como: Cortafongrat 3 ♂; Piemonte: V. d'Arma, near Cle. di Muro 2 ♂; over Montaldo di Cosola, 1200-1250 m, 9.9.1990, leg. Nadig 2 ♂. SWITZERLAND, Canton Ticino: Val Morobbia, Melirola 3 ♂, 3 ♀.

ETHZ: SWITZERLAND, Canton Ticino: Monte Boglia, leg. Fruhstorfer 1 ♂ larva; Val da Colla, Corticiasca, Monte Bar, leg. Nadig 1 ♂, 1 ♀.

NHMB: SWITZERLAND, Canton Ticino: Monte Tamaro, Medé, 1645-1660 m, 26.8.1995, leg. Coray 3 ♂, 2 ♀.

NMBE: SWITZERLAND, Canton Ticino: Miglieglia, Monte Lema, 1620 m, 707.9/99.75, 4.10.2000, leg. Baur 5 ♂, 3 ♀; Miglieglia, Mater delle Tagliadelle, 1160 m, 708.7/99.1, 4.10.2000, leg. Baur 6 ♂, 1 ♀; Monte Generoso, Pianconce, 1400 m, 722.1/86.4, 24.9.1998, leg. Baur 7 ♂, 1 ♀; Monte Generoso, Pianconce, 1400 m, 722.1/86.4, 29.9.1999, leg. Baur 12 ♂.

*E. diurnus*, CAN: FRANCE, Alpes: Col de Perty 5 ♂, 5 ♀; Guillestre 2 ♂; Provence: La Sainte-Baumes, Gémenos 2 ♂; Alpes Maritimes: Gréolières, Cheiron 3 ♂, 3 ♀; Durance, N Embrun 1 ♂; Var: Ampus-Châteaudouble 2 ♂; Vaucluse: Méouge 1 ♂; Mont Ventoux 3 ♂; Hérault: N Lodève 2 ♂. SWITZERLAND, Canton Vaud: Mont sur Rolle 1 ♂; Sepey 1 ♂; Mont sur les Truits 1 ♀; Canton Bern: Moutier 5 ♂, 1 ♀;

CKH: FRANCE, Bouches-du-Rhône: Marseille, surroundings 1 ♂; Mont Majour, 1 ♂; Aveyron: Cause du Larzac, La Couvertoirade 1 ♂; Lozère: Marvyols 2 ♂, 2 ♀; Hérault: Mt. Caroux 2 ♂; Nefiès 1 ♂.

ETHZ: FRANCE, Hautes-Provence: Gavarnie, leg. Sauter 3 ♂, 1 ♀; Dordogne: Lascaux, leg. Sauter 3 ♂, 2 ♀; Vaucluse: Luberon, leg. Sauter 3 ♂; Puy de Dome: St. Victor, leg. Sauter 1 ♂, 1 ♀. SWITZERLAND, Canton Bern: Moutier, leg. Nadig 1 ♂.

NHMB: FRANCE, Haut-Rhin: Rufach [= Rouffach], 8.1923 1 ♂, 1 ♀.

NMBE: FRANCE, Les Landes: Lit-et-Mixe, July 1970, 1 ♀; Lozère: St-Martin-de-Lansuscle, Château le Cauvel, 780 m, 12.7.1991, leg. Baur 3 ♂, 2 ♀, ex larva; Var: Aiguines, 25.9.1985, 1 ♀.

ZSM: FRANCE, Isère: Grenoble, leg. Fruhstorfer 2 ♂.

*E. ephippiger*, CAN: AUSTRIA, Wien: Eichkogel 1 ♂, 2 ♀; Wien 2 ♂; Niederösterreich: Hainburger Berge, Hundsheimerberg 1 ♂; Mautern-Rosatz 1 ♂; Guntramsdorf-Richardshof 1 ♀; HUNGARY, Budapest: Harmashatargh. 1 ♂, 1 ♀; MACEDONIA, Skopje: Vodno 1 ♂, 5 ♀; Sar Planina: Prevalao-Mt. Bistra 1 ♂; Vratnika 2 ♂, 7 ♀; Krusevo 1 ♂; SLOVENIA, Gracnicatal: E Rimske Toplice: 1 ♀; Gorjanci 2 ♂, 1 ♀.

CKH: AUSTRIA, Wien: Eichkogel bei Mödling 1 ♂; CZECH REPUBLIC, Moravia: Mohelno 1 ♂, 1 ♀; HUNGARY: Pillisszanto 1 ♂; SERBIA: Podgorica [= Titograd] 1 ♀; MACEDONIA, Bitola 2 ♂, 1 ♀.

NMBE: AUSTRIA: Wien, leg. Brunner v. W. 1 ♂.

NHMW: many ♂♂♀♀ from Vienna and surroundings, Styria and Carinthia.

*E. persicarius*, CAN: ITALY, Brianza: Eupilio-M. Cornizzolo 6 ♂, 6 ♀; N Brescia: Lumezzane 1 ♂, 1 ♀; Prealpi Bresciane: Capovalle, Monte Stino, 1400-1466 m, 31.8.1992, leg. Nadig 2 ♂, 2 ♀; Como: Vestreno, Madonna Bondo 2 ♂, 1 ♀; Chiavenna, Menarola 3 ♂, 1 ♀; Dorio, Perdonasco 1 ♂; Piemonte: S Biella, La Bessa 2 ♂, 1 ♀; Lombardia: Apennino, Pso. del Penice, 1100-1150 m, 8.9.1990, leg. Nadig 2 ♂, 1 ♀; Pallanza: Cresta della Ceresa 2 ♂; Trarego: Cannero 1 ♂; SWITZERLAND, Canton Ticino: Bré, Aldesago 2 ♀; Bré-M.Boglia, Castra 4 ♀; Gola di Lago 2 ♂; CH, Ticino, Bré-Val Morobbia 2 ♂; Locarno, Cardada 2 ♂, 2 ♀; N Piano di Magadino, Sassariente-Cima Sassello 2 ♂, 1 ♀; Monte Generoso 1 ♂; Val d'Arbedo, Monte Loga 2 ♂, 2 ♀.

ETHZ: SWITZERLAND, Canton Ticino: Salvatore 1 ♀; Generoso-Crocetta 1 ♂, 1 ♀, S. Stefano-Balerna 2 ♀, Capolago-Meride 3 ♀, Arzo-Meride 1 ♀, Ligornetto-Tremona 2 ♂, 5 ♀, Ligornetto 1 ♀, Losone 1 ♀, all leg. Fruhstorfer; San Salvatore, leg. Sauter 2 ♂; 1 ♀, Monte Caslano, leg. Sauter 1 ♂; Maroggia, leg. Krüger 1 ♂.

NHMB: ITALY: Valtellina, Tirano 1 ♂. SWITZERLAND, Canton Ticino: Mendrisio 1 ♀, larvae 1 ♀, Monte Generoso, Pianca comune, 1280 m, 9.8.1988, leg. Coray 1 ♂.

NHMW: ITALY, Trentino: Storo, holotype ♂, paratypes 1 ♂, 2 ♀ of *E. vicheti* Harz [titulators of holotype were missing!]; SWITZERLAND, Canton Ticino: Capolago-Meride 1 ♀, Ligornetto-Tremona 1 ♀ [both ♀♀ Fruhstorfer leg. and det. as "*E. perforatus*"].

NMBE: SWITZERLAND, Canton Ticino: Monte-Carasso, Cima della Pianca, 1660 m, 717.9/119.3, 28.8.2001, leg. Baur & Rösti 4 ♂; Cugnasco, Monti della Gana, 1400 m, 713.5/113.5, 4.10.2002, leg. Baur & Rösti 9 ♂, 2 ♀; Gudo, Monti di Boscaloro, 1100 m, 713.3/116.5, 2.10.2002, leg. Rösti 1 ♂, 1 ♀; Gudo, Fontane di Biasca, 1200 m, 717.1/116.8, 3.10.2002, leg. Baur & Rösti 1 ♂, 1 ♀; Val Onsernone, Barione, 13.10.1961, leg. Huber 1 ♀; Monte Generoso, Pianconce, 1400 m, 722.1/86.4, 24.9.1998, leg. Baur 4 ♂, 4 ♀; Monte Generoso, Pianconce, 1400 m, 722.1/86.4, 29.9.1999, leg. Baur 1 ♀; Miglieglia, Mater delle Tagliadelle, 1160 m, 708.7/99.1, 4.10.2000, leg. Baur 1 ♂; Miglieglia, N Frecc, 850 m, 708.8/98.25, 4.10.2000, leg. Baur 2 ♂; Meride, SE Cassina 860 m, 717.3/84.65, 28.9.1999, leg. Baur 3 ♂, 1 ♀; 1.10.1999, leg. Baur 2 ♂, 1 ♀; Meride, SSE San Giorgio, 1020 m, 717.4/85.4, 23.9.1998, leg. Baur 1 ♂; Lugano, Lurenzin, 1200 m, 716.6/97.8, 13.9.2001, leg. Rösti 1 ♂.

ZSM: SWITZERLAND, Canton Ticino: Ligornetto, 28.7.1919, leg. Fruhstorfer 1 ♀; Generoso-Camoscé, 22.9.1919, leg. Fruhstorfer 1 ♀; Capolago-Meride, 7.9.1919, leg. Fruhstorfer 1 ♂.